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Relevant time- and length scale of touch-down for drops impacting on a heated surface MICHIEL A.J. VAN LIMBEEK, MINORI SHIROTA, University of Twente - Netherlands, CHAO SUN, University of Twente - Netherlands; Tsinghua University - China, ANDREA PROSPERETTI, University of Twente - Netherlands; Johns Hopkins University - USA, DETLEF LOHSE, University of Twente - Netherlands — The vapor generated from a liquid drop impacting a hot solid surface can prevent it to make contact, depending on the solid temperature. The minimum temperature when no contact is made between the drop and the solid is called the dynamic Leidenfrost temperature. The latent heat needed to generated the vapor is drawn from the solid, and in general the Leidenfrost temperature depends on the solid thermal properties. Here we show experiments conducted on a sapphire plate, to minimize the cooling of the solid and ensuring nearly isothermal conditions. By using high speed total internal reflection imaging, we observe the drop base during impact up to about 100nm above the substrate surface. By this technique we are able to study the processes responsible for the transition between fully wetting and fully levitating drop impact conditions as the solid temperature increases. We reveal the relevant length- and time-scales for the dimple formation under the drop and explain their relevance for the late-time dynamics. As the transition regime is traversed from low to high temperature, the liquid-solid contact gradually decreases which reduces the friction with the solid, enhancing the spreading of the drop considerably.

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